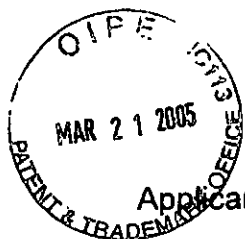


EXHIBIT I

DECLARATION OF LAWRENCE G. HOPKINS
March 15, 2005



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION EXAMINING OPERATIONS

Applicant: Hopkins

Group Art Unit: 3745

Serial No.: 10/806,775

Examiner: Nguyen, Ninh H.

Filed: March 22, 2004

Docket No: Hunt:FanArr1

Title: Fan Array Fan Section in Air-Handling Systems

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UNDER 37 CFR SEC. 1.132

Law Office of Karen Dana Oster, LLC
PMB 1020
15450 SW Boones Ferry Rd. #9
Lake Oswego, OR 97035
March 15, 2005

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Lawrence G. Hopkins, hereby declare as follows:

1. I am an engineer specializing in the fields of fan design, acoustics, vibration, and aerodynamics with particular emphasis in commercial and industrial air handler and ventilation equipment. I received a Bachelors of Science degree in mechanical engineering from The University of Portland in 1975 and became a registered engineer in the State of Oregon in 1982. I have 30 years experience in the fields of acoustics and vibration and 19 years experience in fan and air handling system design. I have worked in the industry in various capacities over the years ranging from engineer to engineering director for three multinational corporations. I directed the construction of two AMCA (Air Movement and Control Association) test facilities each designed and dedicated to the measurement and quantification of fan performance in the areas of air flow rate, consumed power, pressure, efficiency, vibration, sound, and

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structural integrity. I am a member of the Institute of Environmental Engineers, Acoustical Society of America and the American Society of Heating Ventilation Engineers.

2. In 2002, I conceived initial embodiments of the present Fan Array Fan Section in Air-Handling Systems invention as a means of providing a fan system with features and benefits far exceeding present technology. The unique array and controller have also had substantially improved results over prior art devices (such as the AAON device) that would have been unexpected to one skilled in the art. The fan array outperforms current technology by a) demonstrating lower energy consumption for a given air delivery requirement, b) increasing system efficiency under steady and diversified loads, c) increasing system reliability to n+1 or greater redundancy, and d) significantly lowering noise levels.

a) The fan array outperforms traditional systems by allowing air entering or leaving the fan section to do so in a laminar manner thus eliminating stratification on upstream and downstream elements. Upstream and downstream elements may include filters, cooling and heating coils, sound attenuators, and humidification racks. Laminar air flow not only improves the efficiency of the individual devices but reduces pressure drop which reduces fan load and consumed power. In many traditional systems, settling means are installed between the inlet and discharge of the fan and surrounding elements to emulate laminar air flow. The settling means adds pressure drop to the system and causes power consumption to increase for a given air delivery requirement.

b) A fan array lowers energy consumption by allowing the designer to tailor the fan system output to the actual operating point of the process. It is general practice that all fan systems are designed for a worst case scenario. The worst case scenario is based on the greatest demand period which is a combination of coldest or warmest day of the year and loading parameters for filters and coils. It also includes safety factors applied to the design by the design engineer. The result is that nearly every air handler manufactured specified, manufactured, and put into service is over-designed for the normal operating condition. The excess design factors can be as high as 30% to 40% resulting in air handling systems that run at reduced efficiency. Fans

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and motors are most efficient at one load point at a given speed. Motors are most efficient when nearly fully loaded. The fan wall allows the operator to turn off fans when they are not needed thus maintaining optimal motor efficiency and lower power consumption.

c) Unlike traditional air handler systems that require a complete shutdown to repair a motor failure, the fan array of the present invention is designed to operate and maintain system air with one or more motors off and to allow replacement of the damaged motor without turning the air handler off. This "hot repair" feature is unique to the fan array of the present invention and has proven to be exceedingly valuable to institutions or processes requiring stable delivery of conditioned air. Such industries include hospitals, semiconductor manufacturing plants, and pharmaceutical plants. A failure in the air handling system in process critical systems can result in loss of process control and reduced yield. A fan failure in a critical care facility may require evacuation or rescheduling of facility usage such as would occur for surgery units or areas mandating air delivery as a condition of occupancy. For highly critical spaces it is general practice to install two complete air handlers or install two complete fan systems in order to create what is known as n+1 redundancy. This is not the case with the fan array technology since any member of the fan array can be repaired without disruption to the fan system as a whole. This provides 100% assurance that the system will remain stable and not affect critical functions.

d) Fan systems generate higher sound levels when operating at other than peak efficiency. Since the efficiency of the fan array of the present invention can be optimized for a larger range of operating points, the array will produce significantly lower sound levels than traditional systems. This coupled with close fitting insulation elements enables the fan array to outperform traditional systems by as much as 16 dB in the 63, 125, and 250 Hz octave bands. Equivalent reductions in traditional systems would necessitate the use of 7 to 10 foot long sound attenuators each causing a system pressure load and higher power consumption. In many cases the fan array can operate without the need for additional sound attenuation or corresponding pressure requirement.

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3. Between my conception and March 20, 2003 (my priority filing date), I was actively involved in testing and development of the product including developing various embodiments thereof. The claimed invention was not patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the priority date.

4. I have reviewed the references submitted concurrently herewith in my INFORMATION DISCLOSURE STATEMENT. These references will be discussed jointly as the "AAON references." The AAON references disclose a fan system (AAON RL Series air handlers) having up to four fans. For the AAON RL Series air handlers, AAON allows the customer/designer to select from 1 to 4 supply fans ranging in size from 27" to 42.5" in diameter and return fans from 36" to 48" in diameter. AAON offers five unit sizes with pre-designed cabinet dimensions. The fan section length for any size or capacity offered is set at a predetermined length regardless of number of fans or fan size. Dimensional drawings included in the AAON application manual show the airway length for the fan section to be a minimum of 75.5" long to 90" long depending on the model.

5. As compared to the AAON RL Series air handlers, the fan array of my invention is based on using a larger quantity of smaller fans to compress the airway length and reduce overall unit size. The AAON application literature and accompanying software prohibit the customer/designer from selecting smaller fans for the purpose of compressing airway length. Because the AAON references teach against the use of smaller fans, it would not be obvious to one skilled in the art to attempt to scale the fan array for the purpose of saving cabinet length and corresponding real estate within the occupied building.

6. The AAON references do not teach or suggest my claimed use of "six fan units." The AAON references disclose the use of one fan unit, two fan units, three fan units, or four fan units (including a 2x2 array of fan units). Nowhere in the AAON references is there any teaching or suggestion that more fan units are contemplated and I have no knowledge of the use of more than the four fan units by anyone in the industry until after my priority date.

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4. I have reviewed the references submitted concurrently herewith in my INFORMATION DISCLOSURE STATEMENT. These references will be discussed jointly as the "AAON references." The AAON references disclose a fan system (AAON RL Series air handlers) having up to four fans. For the AAON RL Series air handlers, AAON allows the customer/designer to select from 1 to 4 supply fans ranging in size from 27" to 42.5" in diameter and return fans from 36" to 48" in diameter. AAON offers five unit sizes with pre-designed cabinet dimensions. The fan section length for any size or capacity offered is set at a predetermined length regardless of number of fans or fan size. Dimensional drawings included in the AAON application manual show the airway length for the fan section to be a minimum of 75.5" long to 90" long depending on the model.

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7. It is also clear that AAON did not recognize any benefit to increasing the number of fans to six or greater for the purpose of fine tuning the output or achieving higher efficiencies or creating redundancy or incorporating sound attenuating elements. In the AAON design, if one fan motor fails the air flow rate is reduced a minimum of 25%. In the example AAON job provided there are four supply fans each fitted with 25 horsepower motors (19.98 HP required at the operating point) operating at 1580 RPM producing 52,000 cfm. If one fan is turned off or fails, the new maximum flow rate for the unit is determined by speeding the remaining motors up to the maximum motor horsepower. The new maximum flow rate is 47,073 cfm at 1679 rpm at the maximum available power of 25 brake horsepower. Further, the AAON manual forces the user to pick motors based on fan size and duty that will not allow the system to maintain or recover air flow in the event of a motor failure. The AAON system static efficiency at full flow with four fans operating is 67.32% whereas a nine fan array can be configured to run at 72.4% static efficiency using 10 HP motors. Further the nine fan array can be configured to operate with eight fans while maintaining 52,000 cfm at the required pressure of 6.57" tsp while consuming 9.3 brake horsepower at 72.2% static efficiency. Even though one fan is off, the remaining eight fan array will maintain design flow rates while an AAON system with one fan off cannot maintain design flow rates (they actually drop in flow as they overload the motors). It is particularly interesting to note that Cleanpak, along with many other Huntair competitors, went on record criticizing my fan array as something "that would not work." Various publications emerged that contained language raising doubt as to the viability of a fan array. These publications would be available upon request.

8. The AAON references do not teach or suggest my claimed "array controller" for controlling the fan units "to run at substantially peak efficiency by strategically turning selective ones of said at least nine fan units on and off." The AAON references use an array controller that is limited to operating four fans over a limited range. The size of fans available and limited resolution in terms of each fan contribution prohibit the AAON system from functioning in a manner to capture the benefits of the claimed invention. Changes to the AAON array controller scheme or number of fans will

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not achieve the same benefits as the claimed fan array. Therefore it would not be obvious to attempt a modification to the controller or fan design to achieve peak efficiency, nor would it be obvious to expect the fan array in the AAON design to function to maintain set flow rates in the event of a fan motor failure or to be able to achieve peak efficiency at with fewer fans.

9. The unique array and controller have solved an unsolved need of a fan system that can be optimized over a wide variety of conditions while offering unprecedented reliability and ease of maintenance. The fan array, by virtue of a reduced airway length, enables building owners to decrease the size of the equipment mechanical room and achieve more usable space or not over build mechanical space to accommodate large air handling systems. The fan array, because of its smaller size, saves on nonrenewable resources such as steel, insulation materials, and energy.


10. In large part because of my unique array and controller, Huntair (the assignee of the present application) has had significant commercial success as is shown in the accompanying power point presentation (Appendix A) and attached specification sheets taken from recent projects (Appendices B-D). The three specification sheets show three projects (out of many) that specify the Huntair fan array as the only allowed fan system. The three referenced projects include; The Sacramento LDS Temple in California (Appendix B), the Faribault Middle School in Minnesota (Appendix C), and the Phoenix Symphony Hall Renovation Project in Arizona (Appendix D). Each of these specifications explicit specify the Huntair Fan Wall Array as the only acceptable fan system for the project. More examples of sole sourcing the fan array are available on request. A further example of the popularity of the fan array is in critical process facilities such as the new Intel Fab 24.2 expansion in Ireland. Intel expedited a white paper to enable the fan array concept to be used on the new expansion. In this example the fan array was built and tested to show a reduced power consumption of 50% over the traditional system employed in phase 1. In a further example of the popularity of the fan array, Legacy Hospital reduced the number of air handlers from two to one by selecting the Huntair fan array.

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11. I also have specific knowledge that Huntair's competitors are copying my unique array and controller. For example, Cleanpak International copied the fan array and presented concepts and designs to Intel on a recent data center project in Oregon. Cleanpak was ultimately awarded a contract based on price and a fan array that is identical to my fan array. A Technical Bulletin showing evidence of copying is attached as Appendix E. Additional evidence of copying was submitted along with the Petition to Make Special.

I further declare that all statements made herein are of my own knowledge, are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated: March 15, 2005


Lawrence G. Hopkins

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